

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Wireless Telecommunications Bureau Seeks)	WT Docket No 14-17
Comment on Request by Cricket License)	
Company for Waiver of Section 27.60 for)	
Lower 700 MHz A Block License)	

SUPPLEMENTAL *EX PARTE* COMMENTS OF LASER, INC.

Laser, Inc. (“Laser”), on behalf of itself and Leap Licenseco, Inc. (“Licenseco”), successor in interest to Cricket License Company, LLC, Cricket Communications, Inc. and Leap Wireless International, Inc. (collectively “Cricket”), submits these supplemental *ex parte* comments for the Commission’s consideration in connection with the above-referenced waiver request filed by Cricket (“Waiver Request”) regarding the Lower 700 MHz A Block license (call sign WQJQ707) (the “License”) in the Chicago-Gary-Kenosha, IL-IN-WI-BEA (BEA064).

I. EXECUTIVE SUMMARY

Cricket’s Waiver Request and Laser’s Reply Comments¹ have demonstrated that the potential for interference from wireless operations using the License into the adjacent Channel 51 DTV broadcast station, WPWR-TV (Gary, Indiana) (the “Station”) operated by Fox Television Stations, Inc. (“FTS”), is minimal, and that the probability that viewers of the Station’s signal will suffer from interference is remote. Indeed, when considering the viewers of the Station’s over-the-air signal and the percentage of subscribers of each of the four largest carriers in the Chicago market, Cricket has demonstrated that the number of potentially affected viewers using an LTE handset at a distance of 1.5 meters or greater from a DTV receiver does

¹ Reply Comments of Laser, Inc. (March 18, 2014) (“Laser Reply Comments”).

not exceed a *de minimis* level.² There should be no barrier here to the Commission unleashing significant new wireless broadband capacity into Chicago, one of the United States's most densely populated markets. And since the filing of the Waiver Request, several new data points provide additional support for its prompt grant by the Commission.

First, a new technical report filed in the incentive auction docket by FTS's technical consultant effectively provides powerful new laboratory-based corroboration of Cricket's analysis and conclusions submitted on the record in this proceeding, and strong evidence that the co-existence of wireless broadband Long Term Evolution ("LTE") operations and digital television ("DTV") receivers is readily achievable with a low likelihood of adverse interference effects.

Second, a new study recently released for comment by the Commission's own Office of Engineering and Technology ("OET") supports the same conclusion. Notably, both of these new studies show that DTV receivers can tolerate even stronger signals from an adjacent-channel LTE transmitter than the results reported by Cricket's experts, demonstrating the conservative and worst-case nature of Cricket's analysis.

Third, FTS has identified – for the first time (and in spite of years of delay and stonewalling in interacting with Cricket) a sharing arrangement with another 700 MHz A-block licensee whose licensed service area overlaps with the Station's weakest areas of signal

² See Waiver Request at 8-14; Intertek Testing Services NA, Inc., "Evaluation of RF Coexistence LTE Operation on 700 MHz A Block (formerly channels 52/57) and TV Channel 51 Reception," (Jan. 14, 2013) ("Intertek Report"), attached as Exhibit B to the Waiver Request; Newfield Wireless, "Chicago Channel 51 Interference Probability Study (Dec. 27, 2012), at 3-5, attached to the Waiver Request as Exhibit C; Laser Reply Comments at 15-17; Stephen Berger, TEM Consulting, LP *et al.*, Comparison of Cricket and Fox Positions of the Potential for Interference from LTE Operations in the Lower 700 MHz A-block Band to DTV Reception on Channel 51 (Mar. 18, 2014) ("Laser Supplemental Technical Report") at 25-26, attached to Laser Reply Comments as Exhibit A.

coverage, and that are thus most susceptible to potential interference – and yet there have been no reported cases of interference.

All of these data points support a prompt grant of the Waiver Request, so that additional wireless broadband capacity can be deployed for the benefit of Chicago consumers.

II. NEW MSW STUDY

On May 22, 2014, the Consumer Electronics Association (“CEA”) filed a technical report with the Commission in the television broadcast incentive auction docket presenting laboratory testing performed regarding the susceptibility of consumer DTV receivers to DTV and LTE interference.³ These tests were performed by the engineering consulting firm of Meintel, Sgrignoli, and Wallace (“MSW”) on ATSC flat-screen consumer DTV receivers that have been on the market during the period 2012 - 2013. MSW, of course, is the same consulting firm that performed the theoretical simulations and predictive analysis supporting the comments of FTS to Cricket’s Waiver Request,⁴ but its most recent report in the incentive auction proceeding is *wholly supportive* of a grant of the Waiver Request. MSW’s most recent laboratory testing for CEA is similar to the laboratory tests performed by Intertek Testing Services, Inc. (“Intertek”) in support of Cricket’s Waiver Request,⁵ and indeed, MSW’s new test results were actually *better*

³ See Meintel, Sgrignoli, & Wallace, LLC, “A Report To The Consumer Electronics Association *Regarding* Laboratory Testing of Recent Consumer DTV Receivers With Respect To DTV & LTE Interference” (May 22, 2014), filed as an *ex parte* of the Consumer Electronics Association in *GN Docket No. 12-268* and *ET Docket No. 14-14* (“New MSW Study”). The New MSW Study is incorporated herein by reference.

⁴ See Meintel, Sgrignoli, & Wallace, LLC, “A Report to FOX Television Stations Inc. Regarding Severe Impairments to WPWR CH 51 Chicago, IL From Proposed Cricket Wireless Block ‘A’ LTE Signals,” (June 7, 2013) (“MSW Report”) at 26, attached as Exhibit A to FTS Comments.

⁵ See Intertek Report.

than Intertek's results, and showed that a DTV receiver could tolerate a stronger LTE signal in the adjacent band without experiencing interference than Intertek found.

More specifically, Cricket in this proceeding has shown that the MSW analysis of the Waiver Request performed for FTS was cursory and fatally flawed in a number of respects, *e.g.*, inexplicably grounded upon the use of an inapplicable interference model, OET-69, and not based on any actual testing.⁶ Furthermore, MSW compounded its errors by modifying the approach set forth in OET-69 and applying the untested assumption that a -23 dB adjacent-channel desired-to-undesired ("D/U") ratio set forth in Section 27.60 of the Commission's rules⁷ was accurate in the current situation involving potential short-range LTE interference with FTS's DTV operations in Chicago.⁸

In contrast, in the incentive auction proceeding, in which the Commission is addressing both commercial mobile radio service ("CMRS")-into-TV and TV-into-CMRS interference, and specifically has posed questions regarding DTV and LTE interference, MSW's analysis has yielded dramatically different (and contradictory) results. Specifically, CEA commissioned

⁶ See Laser Reply Comments at 10-15; Laser Supplemental Technical Report. As Cricket has explained previously, OET-69 is inapplicable as an interference model for the case being considered for several reasons. The OET-69 model and the values found in Section 27.60 of the Commission's rules were developed for interference between broadcast television stations. At the time they were developed, LTE did not exist and so stations could not have considered it as a source of interference. Furthermore, those models were developed to evaluate transmitters with large separation distances, not the very close distances that are relevant for LTE UE-to-DTV receiver interference. As the Commission itself observed recently in another proceeding: "[UE-into-DTV interference]] is expected involve distances of less than one kilometer up to a few kilometers and the Longley-Rice model may not be suitable for such short distances. See Daniel, W. and Wong, H., 'Propagation in Suburban Areas at Distances less than Ten Miles,' FCC/OET TM 91-1, Federal Communications Commission, Office of Engineering and Technology, January 25, 1991." *Public Notice*, ET Docket 14-14 (January 29, 2014), at n.12.

⁷ 47 C.F.R. § 27.60.

⁸ See Laser Supplemental Technical Report at 16-17.

MSW to study the impacts of DTV-into-DTV and LTE-into-DTV receiver interference. In response, MSW performed tests similar to those performed by Intertek. Like the Intertek Report, the New MSW Study demonstrates *an insignificant level of adjacent-channel interference between low-power LTE user equipment ("UE") and DTV receivers*. Under the LTE Third-Generation Partnership Project ("3GPP") TS36.101 standard, the maximum effective radiated power for a portable UE device such as a handset or dongle is 23 dBm, or 200 mW. Both the Intertek and New MSW studies built upon an OET test report prepared in 2007,⁹ which focused on measuring the D/U ratio at which an adjacent channel signal would cause interference to a DTV television receiver.

The OET 2007 Report, the Intertek Report and the New MSW Study all focused on the ratio defining interference between the desired DTV signal and an undesired signal, from the viewpoint of the DTV broadcast receiver, and at the point just before interference occurs. From the D/U ratio, the distance at which interference will occur can be determined and estimates can be made of the probability of interference in the viewing area. In this regard, the results from the New MSW Study demonstrate that interference does not occur with a DTV broadcast receiver until -46 dB D/U,¹⁰ which shows that there is an *even higher* tolerance for a signal in the adjacent band than the -35 dB to -40 dB D/U ratio found by Intertek.¹¹ Furthermore, like the Intertek tests, the New MSW tests utilized the 5 MHz-wide LTE signal positioned within the 6 MHz-wide A-block channel so as to create a guard band – that is, with the 5 MHz-wide LTE signal

⁹ Stephen R. Martin, "Interference Rejection Thresholds of Consumer Digital Television Receivers Available in 2005 and 2006," OET Report 07-TR-1003 (March 30, 2007) ("OET 2007 Report").

¹⁰ See New MSW Study at 83, Table G-19 (LTE center frequency of 575.5 MHz, representing a 1-MHz guard band (frequency offset) between the top of TV Channel 30 and the bottom of the 5-MHz wide LTE channel).

¹¹ Intertek Report at 13, Figure 5.

shifted upwards such that a 1 MHz guard band is created between the top of TV Channel 51 and the bottom of the LTE signal.

The fact that the New MSW Study found DTV receivers to be even more tolerant of an adjacent band LTE signal highlights the conservative nature of the Intertek testing and Intertek's appropriate use of worst-case assumptions. Both the New MSW and Intertek analyses far exceed the Commission's -23 dB D/U ratio set forth in Section 27.60, which clearly is overly conservative for LTE signals, and especially LTE signals with a 1 MHz guard band. Thus, both the Intertek and New MSW studies validate that DTV receivers can withstand a much stronger adjacent-channel LTE signal than is allowed under the current Commission rule (which was promulgated long before the LTE standard even existed).

If MSW were to expand its study by examining the interference distance for such highly negative D/U ratios from a low-power UE, it would yield even better results than those found by Intertek, where the interference distance was within the 10-meter self-interference distance found acceptable by the Commission for Part 15 incidental radiators. In an expanded study that also focused on real-world scenarios, MSW also would discover how difficult it is to maximize the LTE UE in orientation and polarization to actually create interference. In the actual use environment, factors such as proximity and orientation of the LTE UE to the indoor TV receiving antenna, the position of its human user, and other variables must all be maximized to create the worst-case interference distance. While the worst-case interference distance scenario is possible, it is improbable that all of these variables will be aligned to maximize interference in actual use. Indeed, for all but the most unlikely worst-case situations, the Intertek Report found interference distances of substantially less than 10 meters.

Thus, not only does the New MSW Study support the claims made in the Intertek Report (and the just-released OET study discussed below), it in fact shows an even better (*i.e.*, more immune to adjacent-channel interference) threshold before interference between the devices is observed in the study. And by performing an actual study rather than taking the flawed “theoretical-only” approach used earlier in its analysis for FTS (*i.e.*, only using simulations and unproven assumptions about the D/U ratio at which interference would occur), MSW reached the same conclusion as the Intertek Report: that the Commission’s D/U ratio, established for adjacent band noise like signals, is overly conservative by more than two orders of magnitude. The Commission should therefore disregard the flawed methods used by FTS to calculate interference in this proceeding.

III. OET TESTING

OET also recently performed an actual test of LTE-to-DTV interference.¹² OET’s results, like MSW’s results, demonstrate that DTV receivers can tolerate stronger signals from an adjacent-channel LTE transmitter than Intertek’s results report – specifically, a mean D/U ratio of -42.5 dB, or almost two orders of magnitude less stringent than required by Section 27.60 of the Commission’s Rules.¹³ Significantly, OET’s testing also was performed consistent with the methods used by Intertek. OET’s testing showed an adjacent channel interference D/U ratio of between -38 to -45 dB, with a mean of -42 dB, which is again better than Intertek’s results. OET notably did not use the 1 MHz guard band that Laser would be willing to provide when the 700

¹² See OET Report TA-2014-01, *Measurements of LTE into DTV Interference* (June 17, 2014), released June 20, 2014) (“New OET Study”). The New OET Study is incorporated herein by reference.

¹³ See New OET Study at 10, Table 5 (670.5 MHz LTE center frequency, representing an upper-adjacent LTE signal).

MHz A block is deployed in the Chicago BEA. Using a guard band would only improve the OET results.

As summarized in Figure 1 below, the New MSW and New OET studies clearly demonstrate that DTV receivers can tolerate even stronger LTE signals into an adjacent channel than even the Intertek Report found, and confirm that the statements in the Intertek Report were conservative, worst-case assumptions, as represented. These new studies also demonstrate that the distance at which an LTE device would cause interference to a DTV broadcast receiver would be even less than the Intertek Report presented, thus further supporting Cricket's claim of *de minimis* interference between LTE operations and DTV transmissions in the Chicago market.

Figure 1

Reported D/U Ratios ¹⁴				
Study	MSW Fox	New MSW	Intertek	New OET
D/U Ratio Before Interference Observed	-23 dB ¹⁵	-46 dB	-35 dB to -40 dB	-38 dB to -45 dB
Date	6/7/13	5/22/14	1/14/13	6/17/14

IV. FTS AGREEMENT WITH KING STREET

FTS has represented to the Commission that it reached an agreement with another Lower 700 MHz band licensee, King Street Wireless ("King Street") on November 10, 2011, to allow

¹⁴ For negative D/U ratios defining interference, a more negative number indicates less susceptibility (greater immunity) to the interfering signal. In other words, the more negative the D/U ratio defining interference, the less likely that interference will exist.

¹⁵ -23 dB was based on FCC guidelines, not actual observations.

King Street to deploy wireless operations using its 700 MHz A Block spectrum in Southeast Wisconsin (BEA 63), and Northwest Indiana/Southwest Michigan (BEA 65).¹⁶

Preliminarily, the agreement stands as further evidence of FTS's lack of good faith in its interactions with Cricket, as FTS never informed Laser or Cricket of the existence of this agreement, nor did it ever express any willingness to reach a similar agreement.

In any event, however, for the 2 ½ years the agreement has been in place between FTS and King Street, there have been no instances identified by FTS of interference issues surrounding the co-existence of FTS and King Street operations. Moreover, the King Street BEAs are on the periphery of WPWR-TV's coverage area¹⁷ where signal strength is weakest and susceptibility to adjacent-channel A-block LTE signals would be the greatest. The fact that FTS reached an agreement regarding areas where its signal is most at risk demonstrates that a similar arrangement could easily be reached with Cricket if FTS were motivated to do so, and that FTS's claims of "overwhelming interference to WPWR-TV"¹⁸ are not credible.

V. CONCLUSION

Given the New MSW Study, the New OET Study, and the actual field experience by King Street in Southeastern Wisconsin, Northwest Indiana, and Southwest Michigan, there is now an overwhelming body of evidence in this proceeding that there is no interference problem posed by LTE operations using the License. The Commission should not reward FTS for

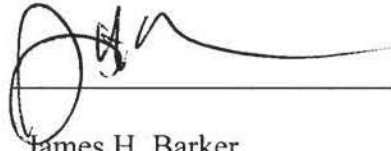
¹⁶ See FTS, Notice of *Ex Parte* Communication, Docket No. 14-17 (June 9, 2014).

¹⁷ Based on the 2010 Census, there are 229,833 persons inside the overlap between the King Street BEA 63 and the WPWR-TV F(50,90) 42.1 dBu dipole-adjusted DTV Threshold contour, and there are 63,617 persons inside the overlap between the King Street BEA 65 and the WPWR-TV contour.

¹⁸ *Id.*

stonewalling when consensual solutions – by FTS’s own admission – are easily achieved. The Commission should grant the Waiver Request forthwith.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'JH', is written over a horizontal line.

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